

CHANGING HOMELAND SECURITY: IN 2010, WAS HOMELAND SECURITY USEFUL?

CHRISTOPHER BELLAVITA

ABSTRACT:

The failure of public safety disciplines to prevent the September 11, 2001 attack gave "homeland security" its chance to emerge as a competing paradigm for organizing the nation's security. But the other disciplines that contribute to the homeland security enterprise have not simply waited for this new discipline to emerge. They responded to the twenty-first century's national security threats by getting better at what they do. They may be eliminating the need for homeland security as a distinct public safety/national security paradigm. At the end of 2010, we were better prepared as a nation to prevent attacks and respond to disasters than we were a decade ago. But that progress may have more to do with the work of homeland security practitioners than with homeland security intellectuals. If homeland security is to become a useful academic and professional discipline, it has to demonstrate how looking at enduring problems through a homeland security framework adds significant value not provided by other disciplines.

What do the concept of homeland security and the intellectual program surrounding that concept actually contribute to the nation's security?

Since 2004 I have asked each new homeland security class at the Naval Postgraduate School what is working in homeland security and what needs to be improved. I ask the questions again

eighteen months later when they are about to graduate.

Over the years, the answers to both questions – and at both times – tend to constellate around the same issues:

- Collaboration — among people, agencies, disciplines, jurisdictions and increasingly, nations;
- Information sharing and intelligence;
- Preventing terrorism — arising from international and domestic sources;
- Preparedness — in its many guises, including most recently "resilience";
- Transportation security — aviation, rail, other public transportation;
- Border control — northern, southern and coastal;
- Illegal immigration;
- Technology — its role in homeland security; what problems it solves and creates;
- Risk management — to include risk assessment and risk informed decision-making;
- Resources — where they come from, how they are allocated, how they are used to sustain progress;
- Critical infrastructure protection — the interface between public and private sectors;
- Leadership — at all levels in the homeland security enterprise.

Our master's degree participants — all of whom work in a homeland security-related public safety discipline — believe the nation is continuously improving its

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ability to prevent attacks, respond to disasters, and recover from a variety of incidents. They also believe we have much more work to do, work that will never be completed.

As I reviewed what happened in the homeland security enterprise during 2010, and compared that with previous “Year in Review” articles, I saw something similar to what our master’s participants observed.¹ Most of the issues that helped to define homeland security have remained fairly consistent over the past five years:

- The meaning of homeland security,
- The nature of the threat,
- Surprise (anticipating and responding to), and
- The strategic approaches to achieving the various homeland security missions.

Those concerns – along with the other issues noted above – outline what I consider to be the enduring problems in homeland security. The dynamic contours of the homeland security enterprise are shaped largely by the shifting attention and neglect these issues receive.²

I have little doubt we are better prepared as a nation to prevent attacks and respond to disasters than we were on September 10, 2001. But it seems to me most of that progress has more to do with the work of homeland security artisans – practitioners skilled in both the practice and theory of what they do – than homeland security intellectuals.³

Public and private sector professionals, exercising the knowledge and skills they earned through discipline-specific training, education, and experience make the nation safer and more secure than it was a decade ago.

It is less apparent to me what value “homeland security” as a distinct – albeit still emerging – body of knowledge or discipline has contributed to that progress.

If homeland security is to become a useful academic and professional discipline, I think it has to demonstrate how looking at enduring problems through a homeland security framework adds significant value not provided by other disciplines. If it is unable to demonstrate value, homeland security may devolve into a legacy concept, like the now largely forgotten idea of civil defense.⁴

Homeland Security as a Discipline

The idea of homeland security as a distinct discipline took root initially because of the federal government’s reaction to September 11, 2001. The homeland security concept was premised on the assumption that public safety disciplines operated too much in isolation from each other. That separation created vulnerabilities al Qaeda exploited.⁵ Homeland security was supposed to prevent something like that from ever happening again.⁶

Shortly after the government acted, some educational institutions explored whether there was – or could be – enough substance in the homeland security idea to construct an academic discipline around its constituent concerns.⁷ By 2010, more than 200 colleges and universities (as well as a few high schools) offered courses and programs in homeland security.⁸

An academic discipline minimally requires:

- A set of problems to work on;

- A body of knowledge to apply to those problems;
- Scientifically legitimate research about the problems;
- Textbooks that aggregate the core knowledge of the discipline;
- Programs to educate students at the undergraduate and graduate levels, including developing PhD programs to advance knowledge in the field.⁹

I believe people interested in homeland security as a potential academic discipline have made modest advances in each of those areas, with the possible exception of educating homeland security PhDs.

But the other disciplines that contribute to the homeland security enterprise have not simply stood around waiting for a new discipline to emerge.¹⁰ They responded to the twenty-first century's national security threats by getting better at what they do. They may be eliminating the need for homeland security as a distinct public safety/national security paradigm.

I still believe there is a place for homeland security as a professional and intellectual discipline. But it is a belief based increasingly more on faith than evidence.¹¹

Homeland Security and Paradigms

As has been argued elsewhere, homeland security can be seen as a pre-paradigm discipline.¹² In the world of practice and in the academy, it must compete against the more mature perspectives offered by the other disciplines in the homeland security enterprise.

Thomas Kuhn uses "paradigm" in two senses that I will adapt for this essay.¹³

A paradigm symbolizes: 1) *the entire constellation of beliefs, values, [and] techniques... shared by members of a given community [of practice].*

A paradigm describes the: 2) *concrete puzzle solutions which, employed as models or examples, can replace explicit rules as the basis for the solution of the remaining puzzles of normal science.*

Translated into a homeland security context, a paradigm is a fundamental way of thinking about a discipline's theories and practices. Each traditional discipline in the homeland security enterprise (for example law enforcement, emergency management, fire service, public health, and so on) has particular knowledge, skills, and preferred ways to think about the issues its members attend to. Because "each group uses its own paradigm to argue in that paradigm's defense,"¹⁴ paradigms provide raw material for constructing the disciplinary stovepipes one continues to find within the homeland security enterprise.

The second part of Kuhn's definition refers to a discipline's "best practices." For example, some people believe the incident command system and its National Incident Management System extension should be the foundational model for all incident response. The National Response Framework holds a similar position as disciplinary exemplar. Both models provide general solutions to a broad set of problems; they do not provide inviolate rules.¹⁵

Each of what can be termed the participating homeland security disciplines brings with it an "articulated body of problems" and a commitment to use particular values, knowledge, skills and practices to (i.e., paradigms) to address those problems.¹⁶

For the routine problems practitioners encounter, they can use their discipline's "normal science,"¹⁷ tested and proven behaviors that reflect successful solutions to similar problems. This approach works as long as practitioners face "tame problems," situations characterized by relatively well-defined problems, obvious stopping points, and solutions that can be objectively judged as right or wrong.¹⁸ The strategies are less effective for "wicked problems": ambiguously defined situations generated by nested social and political complexity, disagreements about what a solution looks like, and so on.¹⁹

The most intractable issues in the homeland security enterprise are related more closely to wicked problems than to tame ones, constraining the ability of traditional disciplines to apply normal problem solving methods to enduring problems.²⁰

But looked at from the perspective of someone who is not an advocate for homeland security as a discipline, one could argue there are very few public safety activities undertaken after September 11, 2001 that were not done in some form prior to the attack. Information was being shared – maybe not as effectively as it could have been, but it was being shared. Agencies were collaborating. Grants were being awarded and spent. Plans were being written and exercised. Lessons were being learned and incorporated into new procedures. Each discipline was practicing its version of normal science.

The central difference between then and a decade later is all those practices have improved across the board. Yes there is room for additional improvement. But critical security practices in this nation are better than

they used to be. That progress may be enough to obviate the need for a distinct homeland security discipline.

Is There a Need for a New Paradigm?

What would justify bringing a new paradigm into an enterprise that may no longer need it? What, asks Kuhn, causes a community to abandon one paradigm for another? What must people do "to convert the entire profession... to their way of seeing science and the world?"²¹

Existing paradigms (represented in this discussion by traditional public safety disciplines) continue unchallenged as long as they satisfactorily address the problems they face. "Paradigm testing occurs only after persistent failure to solve a noteworthy puzzle has given rise to a crisis."²²

September 11, 2001 was the initial crisis that opened the door to homeland security as a potential new discipline. Hurricane Katrina created a second crisis. Pandemic flu (H1N1) created another opportunity for homeland security to step forward and demonstrate how the framework it provides is in any way superior to traditional security approaches. That (arguably unrealized) opportunity may be vanishing.

Paradigm change begins with anomalies: when gaps arise between expectations about what should happen and the reality of what actually does happen. Anomalies typically have to be "sufficiently fundamental" to invoke the unease and dissatisfaction that leads to the next step in paradigm change: a crisis.²³

"Sometimes," notes Kuhn, "an anomaly will clearly call into question explicit and fundamental generalizations

of [a dominant paradigm].²⁴ But an anomaly does not always have to challenge fundamentals before it sparks a change. If the normal science practiced by a discipline inhibits important work, the anomaly is worthy of “concerted scrutiny.”

“When... an anomaly comes to seem more than just another puzzle of normal science [that can be solved using existing frameworks], the transition to crisis... has begun.”²⁵

Said less elegantly, when business as usual gets in the way of doing what needs to be accomplished, it may be time to challenge basic assumptions. This is precisely what homeland security as an intellectual framework was supposed to do.

Is the Nation Over its Security Crisis?

Efforts to address what I called the enduring problems of homeland security can be seen from a “glass half-full” and a “glass half-empty” perspective.

Is the nation (as a whole) generally content with the incremental progress made in addressing many of the enduring problems outlined at the start of this essay and visible in the hundreds of homeland security-related incidents and activities that occurred in 2010?²⁶ Or is there a significant demand for more substantial and more rapid improvement in most, if not all those areas?

Anomalies morph into crises (“the common awareness that something important has gone wrong”)²⁷ when the normal way of dealing with problems is unsatisfactory. The “failure of existing rules [to solve problems] is a prelude to a search for new ones.”²⁸

With the exception of continuing – and important – problems at the southern border and with aviation security, I am not aware of significant national dissatisfaction during 2010 with existing rules for addressing the enduring problems. The traditional disciplines in the homeland security enterprise, relying on their normal (and improved) paradigms, may have passed through last decade’s doubts about the appropriateness of their conceptual dominance.

An outcome like that is compatible with Kuhn’s claim about how paradigm crises end.²⁹

Sometimes existing paradigms eventually solve or ameliorate the problems that provoked a crisis.

As one example, in 2010 – and after some controversy – fusion centers improved their ability to balance information sharing and privacy protection.³⁰ This kind of gradual improvement based largely on trial, error, and correction happens routinely throughout homeland security.

Sometimes problems resist almost all attempts at solution and the “problem is ... set aside for a future generation with more developed tools.”³¹

One could argue many important homeland security-related issues have so far been impervious to solutions: for instance, trying to measure preparedness in a way that will satisfy congress and accountants; figuring out how to formally incorporate social media into prevention and response activities; reducing illegal immigration; controlling the southern, northern, and coastal borders; and reducing the number of congressional committees that have a stake in homeland security. Perhaps these problems are best left to future generations of (homeland

security?) scholars and practitioners to address.

A crisis might also end, writes Kuhn, "with the emergence of a new candidate for paradigm and with the ensuing battle over its acceptance."³²

Here is how that part of the change process works:³³

A new interpretation of some part of the world "emerges first in the mind of one or a few individuals." These are men and women who typically are new to an enterprise, and who are attracted by a "crisis provoking" problem.³⁴

Applied to homeland security, this might refer to undergraduate and graduate students who study homeland security, and to scholars and practitioners who may be at the sociological margins of one of the traditional disciplines: people who for a variety of reasons are not satisfied with the established way of addressing national security concerns. Because they are either comparatively new to the field or are dissatisfied with existing approaches, they are less committed to a traditional discipline's ways of thinking about and working on issues.

The failure of existing disciplines – and the paradigms they embody – to prevent the September 11, 2001 attack gave "homeland security" its chance to emerge as a competing paradigm for organizing the nation's security. Homeland security acted as a symbolic catalyst to trigger reflection and change in traditional disciplines. Maybe the homeland security concept has served its social purpose. Maybe it has contributed all it reasonable can to the question of how to establish a more secure nation.

Are We Finished with Homeland Security?

Thomas Kuhn wrote, "The single most prevalent claim advanced by the proponents of a new paradigm is that they can solve problems that have led the old [paradigms] to a crisis."³⁵

That assertion creates a fair test for advocates of a homeland security paradigm: How does a homeland security perspective (whatever that may mean in practice) help solve any of the enduring problems outlined at the start of this essay? How are ideas derived from that perspective superior to the approaches championed by other disciplines in the homeland security enterprise?

Kuhn also wrote, "In the development of a scientific field...a number of schools [of thought] compete for domination.... [In] the wake of some notable scientific achievement, the number of schools is greatly reduced...and a more efficient mode of...practice begins."³⁶

This provides another test for homeland security's claim to be a discipline: What have been its notable scientific achievements?

To the best of my knowledge, there have been no notable scientific achievements – either theoretical or practical – as a result of looking at security-related issues from a homeland security academic or intellectual framework.

But one can ask the same question of law enforcement, fire services, emergency management, public health and the other allied disciplines – and get the same answer. There have been no notable scientific achievements over the past decade (that I am aware of) generated by their traditional paradigms

that suggest any of homeland security's enduring problems will soon disappear.

I believe the opportunity remains for a "homeland security perspective" to make distinct and valuable intellectual contributions to national security. But I do not think it has much time to convincingly demonstrate its utility.

Where to From Here?

I get my persisting belief in the potential of homeland security – and in the difficulty it faces realizing that potential – from Thomas Kuhn's historical analysis.

Philosophers of science have repeatedly demonstrated that more than one theoretical construction can always be placed upon a given collection of data. History of science indicates that, particularly in the early developmental stages of a new paradigm, it is not even very difficult to invent such alternates. But that invention of alternates is just what scientists seldom undertake except during the pre-paradigm stage of their science's development and at very special [crises] occasions during its subsequent evolution. So long as the tools a paradigm supplies continue to prove capable of solving problems it defines, science moves fastest and penetrates most deeply through confident employment of those tools. The reason is clear. As in manufacture so in science – retooling is an extravagance to be reserved for the occasion that demands it. The significance of crises is the indication they provide that an occasion for retooling has arrived."³⁷

I believe a homeland security perspective can be the means to retool significant parts of public safety for the twenty-first century.

Here is a path I think those who are committed to homeland security as a distinct discipline might productively travel. Some of these activities already are underway.

1. Clarify the set of problems the discipline does and should work on: what we know about causes, consequences, and approaches to addressing those issues.
2. Clarify the foundational knowledge to be applied to those problems. This work should also incorporate categories Kuhn outlines in his "disciplinary matrix:"³⁸
 - Shared values and ethical principles;
 - Symbolic generalizations that (potentially) unite the discipline [e.g., $Risk = f(Threat, Vulnerability, Consequence)$];
 - Shared commitments to certain beliefs, analogies, and metaphors;
 - Shared examples and cases that students encounter from the start of their homeland security education demonstrating how homeland security work is done, and highlighting the link between problem and solution;
3. Systematically gather and feature exemplars of quality homeland security research;
4. Write textbooks that feature the discipline's core knowledge;
5. Educate homeland security PhDs.

On December 30, 2010, "Wired Science" featured the top scientific breakthroughs of 2010. The article reminded readers that in 2010 scientists made a reasonable interpretation of the color of a dinosaur, created a synthetic self-replicating form of life, decoded another drug resistant superbug, produced a human embryo with genetic

material from three parents, created an HIV drug that seems to have remarkable success, and found millions of tons of water on the moon.³⁹

In future years, perhaps beginning in 2011, I hope we can report breakthroughs in homeland security equally as dramatic.

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Christopher Bellavita teaches in the Master's Degree Program at the Naval Postgraduate School in Monterey, California. An instructor with twenty years experience in security planning and operations, he serves as the director of academic programs for the Center for Homeland Defense and Security and is the executive editor of Homeland Security Affairs. He received his PhD from the University of California, Berkeley.

1 Christopher Bellavita, "Changing Homeland Security: The Year in Review — 2007" *Homeland Security Affairs* IV, no. 1 (January 2008), <http://www.hsaj.org/?article=4.1.1>; Bellavita, "Changing Homeland Security: The Year in Review — 2008." *Homeland Security Affairs* V, no. 1 (January 2009), <http://www.hsaj.org/?article=5.1.1>; Bellavita, "Changing Homeland Security: Twelve Questions From 2009," *Homeland Security Affairs* VI, no. 1 (January 2010) <http://www.hsaj.org/?article=6.1.1>.

2 These issues are not the only important concerns for the homeland security agenda. The items in the list are meant as suggestive descriptions of broad problem areas, with each topic having multiple sub-dimensions. On the shifting attention and neglect of issues, see Anthony Downs, "Up and Down With Ecology: The 'Issue-Attention Cycle,'" *The Public Interest*, 28 (Summer 1972): 38-50, and a synthesis of Down's argument in Christopher Bellavita, "Changing Homeland Security: The Issue-Attention Cycle," *Homeland Security Affairs* I, no. 1 (Summer 2005), <http://www.hsaj.org/?article=1.1.1>.

3 Donald A. Schon, *The Reflective Practitioner: How Professionals Think in Action* (Ashgate, September 1995).

Also on this point, see the Letter to the Editor from Nick Castranzos "Security for Artisans" in Volume 7 (February 2011) of *Homeland Security Affairs*.

4 U.S. Department of Homeland Security, *Civil Defense and Homeland Security: A Short History of National Preparedness Efforts* (2006), 4-16.

See also, "Homeland security as a legacy concept," <http://www.hlswatch.com/2010/10/12/homeland-security-as-a-legacy-concept/>.

5 National Commission on Terrorist Attacks upon the United States, *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks Upon the United States*, 1st ed. (New York: Norton, 2004); Paul C. Light, "The Homeland Security Hash," *Wilson Quarterly* (Spring 2007).

6 Prevention was the first priority of the first national homeland security strategy. United States Office of Homeland Security, *National Strategy for Homeland Security* (Washington, D.C.: Office of Homeland Security, 2002).

7 John Rollins and Joseph Rowan, "The Homeland Security Academic Environment" (Homeland Security and Defense Education Consortium, September 2007).

8 James Ramsay, Daniel Cutrer, and Robert Raffel, "Development of an Outcomes-Based Undergraduate Curriculum in Homeland Security," *Homeland Security Affairs* VI, no. 2 (May 2010), <http://www.hsaj.org/?article=6.2.4>; Cheryl J. Polson, John M. Persyn, and O. Shawn Cupp, "Partnership in Progress: A Model for Development of a Homeland Security Graduate Degree Program," *Homeland Security Affairs* VI, no. 2 (May 2010), <http://www.hsaj.org/?article=6.2.3>; Gregory Moore, et al., "Homeland Security-Related Education and the Private Liberal Arts College," *Homeland Security Affairs* VI, no. 2 (May 2010), <http://www.hsaj.org/?article=6.2.1>. See also the Homeland Security and Defense Education Consortium website at <https://www.hsdeca.org/about/>.

9 For a creative perspective about how social science disciplines emerge as a type of fractal around certain core and stable issues, see Abbott, Andrew Delano Abbot, *Chaos of Disciplines* (Chicago: University of Chicago Press, 2001).

10 I am using discipline to refer to activities governed by shared expectations, training, education and rules. I use discipline and profession interchangeably in this essay (although there are significant differences between the two). I am not aware of a definitive list of what "disciplines" should be included within the homeland security enterprise. One might infer certain disciplines from Appendix A in "Quadrennial Homeland Security Review Report," *Quadrennial Homeland Security Review* (U.S. Department of Homeland Security, February 2010). For several years, a colleague, William Pelfrey, has maintained a listing of core and peripheral disciplines in homeland security. His list includes people whose job responsibilities range from having a lot to do with homeland security-related issues to those who have rare and tangential involvement: law enforcement, emergency medical services, fire service, hazardous waste operations and emergency response, emergency dispatch communications, health services, emergency management, governmental administrators, public health, public works, business continuity, cyber-security and information technology infrastructure protection, educational institutions and organizations, homeland security, private security, loss prevention, major event security and public safety, Red Cross, volunteer and non-governmental organizations providing public assistance, public information, media management, public places and major facilities, financial institutions, prosecutors, risk management, skilled trades, transportation services, public/private utilities, and military. (Personal correspondence, 2009)

11 Thomas S. Kuhn — whose ideas provide much of the foundation for the argument I make — writes, "The man [or women] who embraces a new paradigm at an early stage must often do so in defiance of the evidence provided by problem-solving. He must ... have faith that the new paradigm will succeed with the many large problems that confront it, knowing only that the older paradigm has failed with a few. A decision of that kind can only be made on faith." Kuhn, Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 3rd ed. (University Of Chicago Press, December 1996), 158.

12 Christopher Bellavita and Ellen M. Gordon, "Changing Homeland Security: Teaching the Core," *Homeland Security Affairs* II, no. 1 (April 2006) <http://www.hsaj.org/?article=2.1.1>.

13 Kuhn, *Structure of Scientific Revolutions*, 175. For the purpose of the argument I make in this essay, I am using "paradigm" less precisely than would a philosopher or historian of science.

14 Kuhn, *Structure of Scientific Revolutions*, 94.

15 For information about the National Information Management System, see <http://www.fema.gov/emergency/nims/>. Information about the National Response Framework is located at <http://www.fema.gov/emergency/nrf/>.

16 Kuhn, *Structure of Scientific Revolutions*, 136.

17 I am using "science" in this paper in a general sense: systematic knowledge about subjects gained through observation, experience, experimenting (testing) and theorizing. I am using "normal science" to describe the routine work of the disciplines I discuss in this paper. My use of the phrase is much less precise than Kuhn's use. Kuhn, *Structure of Scientific Revolutions*, 5-6.

18 H. Rittel and M. Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences* 4 (Elsevier Scientific Publishing Company, Inc., Amsterdam, 1973): 155-169.

19 Ibid.

20 Christopher Bellavita, "Changing Homeland Security: Shape Patterns, Not Programs," *Homeland Security Affairs* II, no. 3 (October 2006),

<http://www.hsaj.org/?article=2.3.5>.

21 Kuhn, *Structure of Scientific Revolutions*, 144.

22 Ibid., 147.

23 Ibid., 82.

24 Ibid.

25 Ibid.

26 I think the best, and most easily available, source for watching the changing dynamics of homeland security is the Homeland Security Institute's weekly newsletter – found at <http://www.homelandsecurity.org/NewsletterArchives.aspx>. In 2010, they celebrated their tenth year of monitoring news for the homeland security enterprise: <http://www.homelandsecurity.org/bulletin/100709.htm>.

27 Kuhn, *Structure of Scientific Revolutions*, 181.

28 Ibid., 68.

29 Ibid., 84.

30 Chris Strohm, "Most Domestic Intel Centers Lack Privacy Plans," *Government Executive*, October 18, 2010,

http://www.govexec.com/story_page.cfm?articleid=46336&dcn=e_hsw.

31 Kuhn, *Structure of Scientific Revolutions*, 84.

32 Ibid.

33 Ibid., 144.

34 In my view, the following 2010 events produced "crisis provoking problems" in the way I use that phrase in the essay: the election of twenty-six new U.S. governors (and the impact that may have on state homeland security activities), the Deepwater Horizon leak in the Gulf of Mexico, the Haitian earthquake and subsequent response, release of information by WikiLeaks, the Icelandic volcano eruption (and what something like that might do if it happened within the U.S.), the growth of social media during response activities (for example Ushahidi crowd sourcing), the apparent growth (or is growth overblown?) of violent domestic radicalization, human trafficking, illegal immigration, continued growth of cyber threats and attacks, continued violence along the southern border (yet why is the border city of El Paso, TX one of America's safest cities?), the use of full body scanners at airports, mail bombs on aircraft, the chairman of the Joint Chiefs of Staff called the national debt "our biggest security threat," the official end – according to the World Health Organization -- of the H1N1 pandemic, the "end" of the U.S. combat role in Iraq, the continued problems with the U.S. economic recovery, and the absence (again) of a terrorists attack anywhere near the magnitude of the September 11, 2001 attacks. One might also note 2010 saw the end – without much fanfare – of a formal national homeland security strategy; general direction for the entire enterprise transitioned from remnants of the Bush-era homeland security strategy, to the *Quadrennial Homeland Security Review* and then into the National Security Strategy.

35 Kuhn, *Structure of Scientific Revolutions*, 153.

36 Ibid., 178.

37 Ibid., 76.

38 Ibid., 182-191.

39 "Wired Science: The Top Scientific Breakthroughs of 2010," *Wired*, [http://www.wired.com/wiredscience/2010/12/top-scientific-discoveries/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+wired/index+\(Wired:+Index+3+\(Top+Stories+2\)\)](http://www.wired.com/wiredscience/2010/12/top-scientific-discoveries/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+wired/index+(Wired:+Index+3+(Top+Stories+2))).



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